WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device, comprising:

a step of forming an insulating film on a semiconductor substrate;

a step of forming a groove in the insulating film;

a step of filling the groove with a wiring material;

a step of performing CMP to form a filled wiring;

a step of etching the filled wiring material to thereby form a recess;

a step of depositing a cap film on the recess formed by etching the wiring material;

a first polishing step of performing a polishing operation at selectivity of R1 (= removal rate for the cap film/removal rate for the insulating film); and

a second polishing step of performing a polishing operation at selectivity of R2 (= removal rate for the cap film/removal rate for the insulating film),

wherein each of the first polishing step and the second polishing step is performed by using a slurry having a condition of R1 > R2.

2. A method of manufacturing a semiconductor device according to claim 1, wherein a depth of the recess formed by etching the wiring material is larger than the thickness of the cap film.

3. A method of manufacturing a semiconductor

device according to claim 1, wherein R1 in the first polishing step is equal to or larger than 1 and R2 in the second polishing step is equal to or smaller than 1.

4. A method of manufacturing a semiconductor device according to any one of claims 1 to 3, wherein a main component of the cap film is any of Ti, Ta, Nb, W, Cr, V, Pt, and Ru, a nitride, an oxide, a boride, and an alloy of any of the elements, and a mixture of the elements.

5. A method of manufacturing a semiconductor device according to any one of claims 1 to 3, wherein a main component of the cap film is any of Si, an Si oxide and an Si nitride, or the cap film is a fluorine-doped oxide film or poly-methyl-siloxane.

6. A method of manufacturing a semiconductor device according to any one of claims 1 to 3, wherein a main component of the wiring material is any of Al, Cu, W, Ru, Ag, Mo, and Si, a nitride, an oxide, a boride and an alloy of any of the elements, and a mixture of any of the elements.

7. A semiconductor device comprising:

an insulating film formed on a semiconductor substrate;

a groove formed in the insulating film;

a first conductive film formed on inner walls of the groove;

a second conductive film formed on the inner walls via the first conductive film; and

a third conductive film formed so as to cover the upper of the second conductive film,

wherein the level of the surface of the insulating film near the first conductive film is gradually lowered from a position close to the first conductive film.

8. A semiconductor device comprising:

a first insulating film formed on a semiconductor substrate;

a groove formed in the first insulating film;

a second insulating film formed on inner walls of the groove;

a conductive film formed on the inner walls via the second conductive film; and

a third insulating film formed so as to cover the upper of the conductive film,

wherein the surface of the first insulating film and the surface of the third insulating film in the center portion of the groove are almost at the same level, and the surface of the second insulating film and ends of the third insulating film are higher than the level.

9. A semiconductor device according to claim 8, wherein the main component of the first insulating film and that of the third insulating film are the same.

10. A semiconductor device having a filled Cu wiring structure formed in an insulating film, wherein a layer made of Al or an Al alloy is formed on the upper surface of a Cu wiring portion via an intermediate layer.

11. A semiconductor device according to claim 10, wherein the intermediate layer contains at least one element selected from Ti, Zr, V, W, Ta, Nb, Cr, Sn, Co and Ru.

12. A semiconductor device according to claim 10, wherein the intermediate layer contains a nitride, an oxide, a boride, or a carbide of at least one element selected from Ti, Zr, V, W, Ta, Nb, Cr, Sn, Co and Ru.

13. A method of manufacturing a semiconductor device according to claim 2, wherein a main component of the cap film is any of Ti, Ta, Nb, W, Cr, V, Pt, and Ru, a nitride, an oxide, a boride, and an alloy of any of the elements, and a mixture of the elements.

14. A method of manufacturing a semiconductor device according to claim 2, wherein a main component of the cap film is any of Si, an Si oxide and an Si nitride, or the cap film is a fluorine-doped oxide film or poly-methyl-siloxane.

15. A method of manufacturing a semiconductor device according to claim 2, wherein a main component of the wiring material is any of Al, Cu, W, Ru, Ag, Mo, and Si, a nitride, an oxide, a boride and an alloy of

any of the elements, and a mixture of any of the elements.

16. A method of manufacturing a semiconductor device according to claim 3, wherein a main component of the cap film is any of Ti, Ta, Nb, W, Cr, V, Pt, and Ru, a nitride, an oxide, a boride, and an alloy of any of the elements, and a mixture of the elements.

17. A method of manufacturing a semiconductor device according to claim 3, wherein a main component of the cap film is any of Si, an Si oxide and an Si nitride, or the cap film is a fluorine-doped oxide film or poly-methyl-siloxane.

18. A method of manufacturing a semiconductor device according to claim 3, wherein a main component of the wiring material is any of Al, Cu, W, Ru, Ag, Mo, and Si, a nitride, an oxide, a boride and an alloy of any of the elements, and a mixture of any of the elements.